

Davis (E. H.)

REPORT

OF THE

COMMITTEE ON THE

STATISTICS OF CALCULOUS DISEASE

IN OHIO, MADE TO THE

OHIO STATE MEDICAL SOCIETY,

AT THE ANNUAL MEETING,

HELD IN COLUMBUS, JUNE, 1850.

BY E. H. DAVIS, M. D.



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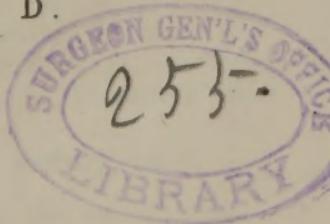
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ПЯТЫЙ

The Author being absent at the time of publication, the proof sheets were not submitted to his inspection, and consequently many errors occur in this Report.

REPORT OF THE COMMITTEE ON THE STATISTICS OF CALCULOUS DISEASE IN OHIO.

Your committee, in pursuance of the resolutions passed by the late meeting of the Ohio State Medical Society, beg leave to report, that they entered upon their duty in January last, by collecting the statistics within their own counties; and, also, by issuing the following circular, propounding certain questions, and asking the co-operation of the Medical Faculty throughout the State.

CIRCULAR.

The question being under discussion, whether geological formations have any influence in the production of certain diseases, such as cholera, gravel, goitre, &c., the following resolutions were offered, by Dr. Davis:

WHEREAS, the question is unsettled whether geological formations have any influence in the formation or modification of calculous disease, and as the State of Ohio is considered favorable for collecting statistics on this subject, her territory being nearly equally divided between the limestone and coal, or freestone formations; therefore,

Resolved, That this Society consider the subject of sufficient importance to recommend the medical profession in each county of this State to collect all the statistics in reference to calculous disease in their respective counties, and forward the same to a committee appointed by this Society.

Resolved, That a committee of three be appointed to collect and arrange the statistics upon this subject, and report the same to the next annual meeting of this Society.

E. HAMILTON DAVIS, M. D.,
PROF. J. P. KIRTLAND, M. D.,
PROF. R. D. MUSSEY, M. D.
Committee.

CHILLICOTHE, February, 1850.

DEAR SIR—Will you be kind enough to collect the statistics in reference to calculous disease in your county, in accordance with the wish of the State Medical Society, and forward the same to me in time to incorporate the facts into a report for the next annual meeting, to be held in the first week in June next. Due credit will be given for all facts furnished.

To facilitate and simplify the matter, it would be well to arrange the facts in the following order, viz :

1. The number of cases of calculous disease that have occurred in your county for the past ten or twenty years.
2. The number of cases operated on, and by whom.
3. The number of cases determined by post mortem examination.
4. The number of cases passing sand or gravel per urethra.
5. The number of cases determined by sounding, and not otherwise.

The age and sex of the subject; his native country; length of residence in the locality where disease was developed; the number and character of the calculi; the kind of water prevailing, and rocks, in your county, are facts very much desired wherever they can be furnished. Have you ever known any of the domesticated animals afflicted with this disease? Have you any specimens of calculi analyzed, or that you would like to have analyzed?

It is hoped that all who desire to increase the the number of medical facts, to aid and promote the profession, and increase its usefulness, will attend to these statistics, and forward the results as soon as practicable. By so doing, they will place the committee, as well as the profession at large, under lasting obligations.

Most respectfully yours,

E. H. DAVIS, *Chairman.*

About two hundred copies of this circular were sent to the profession throughout the State, and we regret to say that not more than thirty replies have been received. Notwithstanding this partial attention to the subject, a considerable amount of valuable knowledge has been collected, sufficient to increase greatly our interest in the subject, and to awaken a desire for like information from the remainder of the State.

It is with this view that your chairman consents to lay before the Society the few facts already obtained, hoping they may serve to stimulate the profession in the parts of the State not yet heard from, to attend to the request of the Society, by sending forward their statistics during the coming year, so as to enable your committee to make a full and complete report upon this subject at their next meeting.

We think it unnecessary to introduce any argument to prove the importance of collecting such medical statistics: for it must be obvious to every thinking mind that this is the only true mode of arriving at distinct views or accurate conclusions upon most subjects. This is more especially the case when applied to the branches of public hygiene and etiology of disease. It is in this way only that we can demonstrate the existence or comparative frequency of disease in different countries. It enables us to determine the success of the various measures resorted to for the purpose of removing the causes or relieving the evils attendant upon disease. They may also become useful as a means of estimating the comparative value of the different systems of medical practice. But in the present investigation our

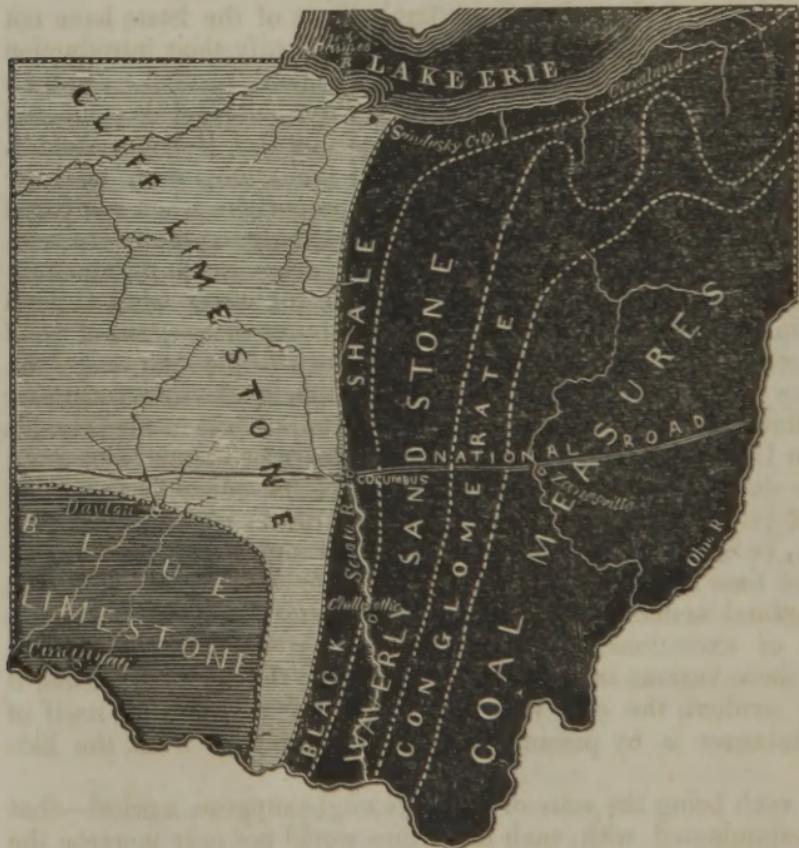
object is to determine whether calculous disease is more frequent in limestone than coal districts; and, also, whether the chemical character of the calculi are the same in the two geological formations.

According to some medical philosophers, "man is the fair exponent of the principles contained in the soil on which he lives." Without assenting wholly to this proposition, we can readily conceive how many substances may be introduced into the human system in the water we drink—particularly that obtained from springs and wells. This water first percolates through the soil, collecting carbonic acid, which enables it to dissolve and hold in solution the various salts of lime, magnesia, and other substances. This is evidently the case throughout the limestone region: for when the water becomes exposed to the atmosphere, or to the boiling temperature, the carbonic acid passes off, causing a deposit of earthy salts in a solid form, such as the stalactites and incrustations of caverns, and the hard calcareous coating on the inside of tea kettles used in those districts.

The analyses of the water in different parts of the State have not been brought to that state of completeness to justify their introduction here; yet we may mention some of the general results. From an examination of the water in Muskingum, Trumbull, and Washington counties, situated in the coal measures, made by Drs. Holston, Nichols, and Hildreth, we find the carbonate of lime, magnesia, and the chloride of sodium, to be in much smaller proportion, when compared with the results from the limestone water, whilst the sulphates of iron, soda, magnesia, lime, alumina, and potassa, are in much greater proportion. We find, on evaporating an ounce of water from wells in this vicinity, there is left from 10 to 35-100ths of a grain of solid matter, which proves to be mostly carbonates of lime and magnesia. This very nearly agrees with the examination made by Prof. Peter on the limestone water of Lexington, Ky. He remarks in his valuable paper on Urinary Calculi: "If we suppose only two-tenths of a grain of these earthy carbonates are contained in an ounce of water, we have 3.2 grains to the pint; and if a person drinks half a gallon of it in a day, he takes into his system at the same time 12.8 grains of carbonate of lime and magnesia, which will unite with any of the acids of the animal economy, and thus tend to neutralise those fluids, secretions or excretions, which are naturally in an acid condition." Now if these various salts are introduced into the fluids in excess, it is quite evident, the only way the system has of relieving itself of such substances is by passing them off in excretions from the kidney.

This such being the state of facts, we might suppose, *a priori*—that water contaminated with such impurities would not only increase the number of calculous affections, but also give character to the calculi themselves. In justice to your committee, it may be well to remark here, that they are not wedded to any preconceived opinions, or defenders of any particular theory, but only seekers after truth, desiring the facts to speak for themselves; we therefore proceed immediately to them.

The State of Ohio, as you will perceive by the accompanying cut, is nearly equally divided between the geological formations, denominated the blue and cliff limestone on the west, and the sandstone, or coal bearing series on the east. True, there are circumstances that may modify or change the effects of these formations to some extent. For instance, portions of our State are covered, to a considerable depth, by drift, which may exert some influence on the character of the water in those parts. On the other hand, some of our rivers take their rise in the limestone formation, (the Scioto for instance,) and then pass down through the shale and sandstone series, bearing in their waters a solution of the salts of lime and magnesia, and depositing the lime pebble in all their alluvions. There are also a few thin strata of lime scattered throughout the coal measures. But these circumstances are not considered sufficient to vary much the general results.



We have received from twenty-two counties tolerably full reports, and partial ones from eighteen more; making forty out of eighty-four, the whole number in the State. The counties heard from, although not half in number, yet contain rather more than half the population of the State. In this number the reports show the ex-

istence of calculous disease in thirty-five, and that there has not been a case observed in the other five for the past twenty years.

We have been struck with the remark made by most of our correspondents, that this disease is by no means frequent in their county. Yet we think, by comparing our statistics with those of other countries, we will find they stand quite high on the list.

In order to condense most of the facts into as small a compass as possible, we have arranged in the following table. By doing so, we lay the whole matter, with our authorities, before the profession, hoping they will correct any mistakes that have been made in time for the next report.

1. The county. 2. The initial letter standing for the geological formation. 3. Number of years observed. 4. The whole number of cases. 5. Number of operations. 6. Number determined by post mortem examination. 7. Number passing sand or gravel. 8. The sex. 9. The surgeon operating. 10. By whom reported.

TABLE.

COUNTIES.	Sex.		Surgeon.	By whom reported.
	M.	F.		
Adams -----	-	-	Dr. Scott.	Dr. Davis.
Allen -----	-	-	Dr. Russell.	Dr. Russell.
Ashtabula -----	-	-	Dr. Ackley.	Dr. Ackley.
Athens -----	-	-	Dr. Blackstone.	Dr. Blackstone.
Brown -----	-	-	{ Dr. Buckner, 3; Dr. Dudley, 1. § Dr. Buckner.	{ Dr. Buckner.
Belmont -----	1	1	-	Dr. Gaston.
Butler -----	1	2	-	Dr. Falconer.
Clermont -----	20	-	-	Dr. Buckner.
Cuyahoga -----	14	4	-	Dr. Ackley.
Delaware -----	10	2	-	Dr. Carney.
Erie -----	7	4	-	Dr. Ackley.
Fairfield -----	3	-	-	Dr. Boerstler.
Franklin -----	2	-	-	Dr. Howard.
Hamilton -----	1	-	-	Dr. Mussey.
Harrison -----	5	3	-	Dr. Berkeley.
Highland -----	6	9	-	Dr. Sams.
Holmes -----	15	8	-	Dr. Russell.
	18	1	-	Dr. Russell.
No. of cases of geological formation.				
No. of cases determined by P. terminated by P. examination.				
No. of cases passed sand gravel.				
	M.	F.		

Jackson	-----	-----	Dr. Miller.
Knox	-----	-----	Dr. Russell.
Lake	-----	-----	Dr. Beardsley.
Licking	-----	-----	Dr. Russell.
Lorain	-----	-----	Dr. Russell.
Lucas	-----	-----	Dr. Ackley.
Madison	-----	-----	Dr. White.
Medina	-----	-----	Dr. Howard.
Morrow	-----	-----	Dr. Ackley.
Montgomery	-----	-----	Dr. Ackley.
Muskingum	-----	-----	Dr. Bushnell.
Pickaway	-----	-----	Dr. Bushnell.
Pike	-----	-----	Dr. Davis.
Portage	-----	-----	Dr. Davis.
Preble	-----	-----	Dr. Estep.
Richland	-----	-----	Dr. Howard.
Ross	-----	-----	Dr. Nichols.
Scioto	-----	-----	Dr. Hildreth.
Stark	-----	-----	Dr. Mussey.
Summit	-----	-----	Dr. Gross.
Trumbull	-----	-----	Dr. Mussey.
Washington	-----	-----	Dr. Mussey.
Warren	-----	-----	Dr. Mussey.

We do not claim that our reports are full or entirely complete, except in a few counties. Taking their returns as data, we feel justified in stating that not more than $\frac{3}{4}$ of the cases that have occurred in the 40 counties within the average period of observation, (15 years) have been returned. We, therefore, think it proper to add the supposed deficit of 25 per cent. to the number reported, in making an estimate for the State. The time for which the statistics are collected varies in the different counties from five to twenty years. The population of the 40 counties, by the census of 1840, was about 900,000, or three fifths of the whole State. The number of cases reported as operated on are 74. Number determined by post mortem examination 13. Number passing sand or gravel 64. If we are correct in adding 25 per cent. for the supposed deficiency in the returns, we will have the following results for the whole State. Average population of the State for the past 14 years 1,600,000—average number of cases operated on per annum, adding those determined by post mortem examination 12, making about one operation per annum for 135,000 inhabitants.

But when we compare the results taken from the counties situated in the two geological formations, we find them presenting the following difference. In 18 counties situated in the limestone region, including those along the Scioto valley, with a population of 394,000—average time of observation 12 years, we have reported 46 cases by operation, and 10 by post mortem examination. Adding one fourth to complete the returns, it then shows the proportion to be 1 case per annum to about 60,000 inhabitants, whilst on the other hand, 22 counties in the sandstone and coal series, with a population of 552,000—with an average time of observation of 16 years, report 23 operations—2 cases by post mortem examination. By adding one fourth as above, we have 1 case per annum to 238,000 population—showing this disease as represented by the operations and post mortem examination, to be nearly 4 times more frequent in the limestone formations than in the coal series.

The question very naturally presents itself here, whether the blue or cliff limestone favors most the formation of these concretions? We would remark that our reports have not been sufficiently numerous to draw any positive conclusions, but so far as they go, they favor the idea, that such cases are most numerous in the blue limestone. We will give here the comparative frequency of the disease, from the reports in a few localities in this State, and then compare them with those of other counties.

Brown county-----	1 case per annum in 20,000
City of Dayton-----	1 case per annum in 25,000
City of Columbus-----	1 case per annum in 30,000
City of Cincinnati-----	1 case per annum in 80,000

To account for the great difference exhibited between Cincinnati and the other points mentioned, we find a sufficient reason in the fact, that most of the water used in that city is taken from the Ohio river, which is but slightly contaminated by calcareous impurities.

From Dr. Peter's paper alluded to above, it is evident that calculous affections are more frequent in Kentucky than in any other part of the world in which inquiries regarding this subject have been instituted. This inference is confirmed by the fact, that Dr. Dudley, the distinguished Surgeon of that State, is said to have performed the operation of lithotomy some 200 times. Lexington, from whence Dr. P. draws his facts, is situated on the blue limestone, which formation extends into Ohio as far north as Dayton.

We here subjoin a table showing the relative frequency of this disease in different countries :

Countries.	No. of cases per annum.	Authority.
Ireland, (the pauper population)-----	1 in 875,000	D r. Yelloby
" City of Cork-----	1 in 800,000	" Civiale
Bohemia-----	1 in 347,000	" "
Islands of Malta-----	1 in 300,000	" "
Cornwall and Devonshire, (England)-----	1 in 293,000	" Smith
Glasgow-----	1 in 77,000	" Yelloby
Ionian Islands-----	1 in 60,000	" Civiale
Bristol, (England)-----	1 in 41,000	" Yelloby
Lombardy-----	1 in 38,500	" Civiale
London-----	1 in 38,000	" Yelloby
County of Norfolk-----	1 in 34,000	"
Copenhagen-----	1 in 22,000	" Civiale
City of Norwich-----	1 in 21,000	" Yelloby
City of Lexington-----	1 in 16,000	" Peter

This fact must be kept in view in comparing these tables, that those of Ohio and Kentucky represent the whole number of cases, while the rest represent those only in hospital practice.

Your committee would further state, that of the 74 operations reported, 72 were by cutting and 2 by crushing. In all this number, but 6 are reported as unsuccessful, and 2 that required a second operation. This success compares favorably with like statistics from other countries.

* In the Pennsylvania Hospital, 83 cases have undergone the operation with the following result: 72 cured, 10 died and 1 is set down as relieved. † Dr. SMITH, of Bristol, England, furnishes a table of 354 operations in that country, which shows the following figures: 275 cured, and 79 deaths; or when compared, thus—

*Report of the committee on Surgery—Trans. of the Am. Med. Ass. 1848.

†Statistical inquiry into the frequency of Stone in the bladder in Great Britain and Ireland.

Dr. SMITH's table for England and Ireland—354 operations, 79 deaths, or 1 in 4 $\frac{1}{2}$.

Pennsylvania Hospital, 82 operations, 10 deaths, or 1 in 8 $\frac{1}{2}$.

Ohio Report, 72 operations, 6 deaths, or 1 in 12.

With regard to the sex and age of the subjects operated on, we have the following exhibit: In 71 cases in which the sex is reported, 66 are males and 5 females, or about 7 per cent. females. In 45 cases reporting the age, it stands thus:

Between	4 and 10	years of age	-----	14 cases.
do	10 and 20	do	-----	10 do
do	20 and 30	do	-----	6 do
do	30 and 50	do	- -----	8 do
do	50 and 70	do	-----	5 do
do	70 and 84	do	-----	2 do

The oldest patient operated on being 84—the operation performed by Dr. ACKLEY, of Cleveland.

The number of calculi in seven instances, are reported to be from 2 to 5. In the Lexington collection 31 were taken from one patient. Dr. BIRD, in his paper on the calculi of Guy's Hospital, remarks that 142 were removed from a single person. In the case of the late Chief Justice Marshall, the number was said to amount to 1,000. In two post mortem examinations made in Ross county, by Dr. SCOTT and myself, there were found in one case 127 calculi, and 81 in the other, varying in size from a mustard seed to that of a hickory nut.

CHEMICAL CHARACTER OF THE CALCULI.

We have not been able to collect calculi from a large number of subjects. Most persons afflicted with this disease being desirous of retaining the object which was the source of so much pain. Many other specimens have found their way into the cabinets of Medical Colleges, the proper place for them, provided the faculty of the institutions would collect their true history, and furnish it, together with an accurate analysis, to the profession. We have over 200 specimens of calculi taken from 12 human subjects, and 11 from domestic animals, viz: the horse, cow, sheep, hog and dog. As yet, we have not completed the analysis of all the specimens, but we will give the results of an examination made by my friend Prof. PETER, of Ky., on a few specimens sent him, together with those made by others of this State. Dr. P. returns the following statements:

Calculi marked No. 1, part of 127 taken from Mr. L. of Ross co., Ohio, post mortem, contained a *nucleus* composed of nearly *pure uric acid*—the exterior layers contain a little *urate of ammonia* and some *oxalate of lime*, with traces of phosphates.

Calculi No. 2, part of 81 taken from Mr. C., Ross co., A. D., 1845, was principally what is called *fusible calculi*, or a mixture of *phosphate of lime*, with the *ammonio-phosphate of magnesia*, and a trace of *uric acid*.

Dr. HOLSTON, of Muskingum county, sends the following account of a stone removed and examined by himself: "Stone large and exceedingly hard—weight, 7 $\frac{3}{4}$. 33., externally grayish brown, internally pure white, of lamellated structure. A fragment heated to redness in a platinum crucible, blackened without swelling, then became white externally; but on being reduced to powder its color was gray. Dilute nitric acid dissolved it. Under the most intense heat produced with the mouth blow-pipe, a small fragment exhibited signs of fusion at the corners; on analysing 8 gr. it was found to consist of

Phosphate of lime-----	87.50	} in 100 parts.
Animal matter not analysed-----	12.50	

Drs. MUSSEY, HOWARD, and other surgeons of this State, have remarked that their collections principally consist of phosphates of lime and magnesia, with but few specimens of pure uric acid, and mulberry varieties.

It is evident, from the few results already obtained from examination of calculi in Ohio, that they possess most of the peculiarities of those in the Kentucky collection. For the purpose of understanding more fully these peculiarities, we copy some of the results of an examination made by Prof. PETER on 78 human calculi found in the Medical Museum of Lexington, Ky., which is undoubtedly the most extensive and authentic of any yet made in the Mississippi Valley.

He found the Nuclei to consist as follows :

Out of 78—

Uric acid	mainly in	.....	32
Urate of ammonia	do	.....	26
Oxalate of lime	do	.....	7
Phosphates	do	.....	7
Foreign substances	do	.....	4
Cystine	do	.....	2

The *Bodies* are composed as follows :

Of Uric acid	.....	34
Of Urate of ammonia, &c.,	.....	2
Of Oxalate of lime	.....	16
Of Mixed phosphates	.....	16
Of Triple phosphates	.....	4
Of Cystine	.....	2

In addition—

Uric acid exists in <i>notable proportion</i> in	.....	4
Urate of ammonia	do	do
Oxalate of lime	do	do
Mixed phosphates	do	do
Phosphate of lime	do	do

The Cortex, or outer layer, was of Uric acid in	37
Of Urat of ammonia with phosphates in	2
Of Oxalate of lime	9
Of Mixed phosphates	37
Of Triple phosphates	2
Of Cystine	2

The peculiarities presented by the Lexington collection as compared with others whose history is known, are as follows :

A. *As regards the Nuclei.*

1. A great deficiency in the proportion of uric acid.
2. A great excess in the proportion of nuclei of urate of ammonia, and of the earthy phosphates.

B. *In relation to their general composition.*

The same peculiarities pointed above, in regard to nuclei, with the additional one :

3. An excess in the proportion of the mulberry, or oxalate of lime, calculus.

From a careful review of the chemical nature of the food and water of this district, Dr. PETER arrives at the following conclusions, which are also applicable to a large portion of Ohio :

"It appears, therefore, highly probable that the use of the limestone water, and a corn and bacon diet, may be the principal cause of the great excess in the earthy phosphates and oxalate of lime in the calculi of this region ; that the earthy carbonates in the water, by neutralizing to some extent the natural acidity of some of the animal fluids may be the cause of the very small proportion of pure uric acid, and the great proportion of urate of ammonia to be found in them; and that both these causes acting together with, and superadded to all the other circumstances predisposing to urinary deposits to be found every where occasion the great increase in the proportion of calculous disease which is presented in this country."

GENERAL OBSERVATIONS.

From the foregoing facts, the question may arise, how shall the evils growing out of the use of well and spring water be averted ? We would recommend those afflicted with this disease to use rain water, which may be collected in deep cisterns, where it will remain sweet and pure for any length of time. But when it is not practicable to procure this, we advise boiling the water before using, as this will deposit most of the salts.

The large number of cases determined by post mortem examination, would seem to indicate the lack of a proper diagnosis on the part of the profession. But we presume most of these cases have refused to be operated on. We would earnestly recommend the early use of the sound, in all cases where there is the least suspicion of stone in the bladder, as the only means of arriving at correct conclusions. As a

proof of the great importance of detecting these concretions at an early period, so as to adopt measures for promoting their discharge per urethram, we copy Dr. HOLSTON's third case :

"Mr. BRADFORD—æt 40.—On sounding, detected a small calculous—urethra very large and dilatable. Directed 20 drops of *wine of tobacco* three times a day, which was increased on the third day to 40 drops, with copious draughts of flax seed tea. He was forbidden to urinate for 24 hours. For 20 hours he endured the ordeal of nausea and urinary torments, aided during the last seven or eight by a broad ligature around the penis. On removing the tape, the urine gushed forth as thick as his finger, and with it the calculus, the size and shape of an almond. Ten years have since elapsed without a return of the difficulty."

We would suggest, as another valuable means of enabling us to form a correct diagnosis in diseases of this kind, to make ourselves familiar with the peculiar forms of crystals belonging to the various salts which may be contained in the urine—then by evaporating a few drops on glass, and placing it under a microscope, it will reveal the character of substance held in solution. In this way we have been able to detect two or three salts in the same drop.

Before closing this subject, we would recommend the profession throughout the entire Valley of the Mississippi, as well as in Ohio, to keep register of this and other important diseases, and then collect the statistics at least once in ten years. In this way we might learn the influence that a change of manners, customs and habits of a people may have on the diseases which afflict them. For there are portions of this great Valley that undergo, in a single age, all the transitions from a *log hut residence, and corn and bacon diet, and ardent spirits as a beverage, to fine houses, luxurious living, with the free use of wine and fermented liquors!*

E. HAMILTON DAVIS, *Chairman.*

NOTE.—We would ask the attention and co-operation of all who receive this paper in collecting the statistics of this disease and forwarding them to the Chairman in the City of New York.

